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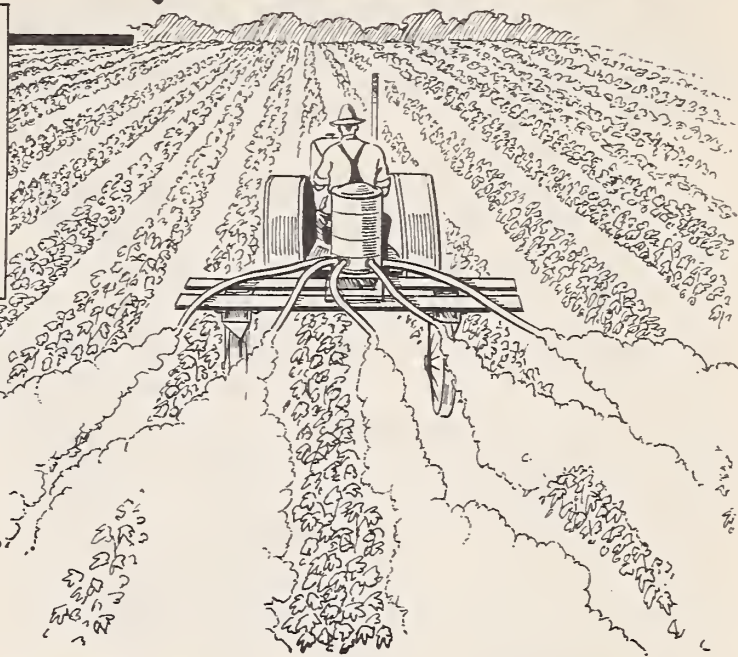
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SAVE COTTONSEED FROM

Insects!

FACT SHEET

✓ U. S. DEPARTMENT OF AGRICULTURE
Office for Food and Feed Conservation
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Cotton lint bulks so large in value that it successfully conceals the fact that the United States cotton crop is a sizeable food crop as well.

Cottonseed is, in fact, an important source of proteins and fats and oils.

Therefore, careful protection of the U. S. cotton crop from the ravages of insects should stand to the fore among the various efforts the Nation and its farmers are making to conserve and enlarge our supplies of food and feed. Insects each year take an enormous toll of the cotton crop. If they had been prevented from causing damage in 1946, for example, it is estimated that the Nation would have had about 613,000 tons more cottonseed, the equivalent in feed value of 54 million bushels of corn. This additional yield would have provided about 276,000 tons of cottonseed meal to bolster farm feed supplies. Or it can be estimated that this additional yield would have provided enough protein to produce about 178 million pounds of beef, or 690 million gallons of milk, or 179 million pounds of refined cottonseed oil.

The annual loss from insects to cotton lint and seed is estimated to have averaged more than \$200,000,000 during the five-year period 1942-1946. In 1946, a year of severe insect damage and high cotton prices, the loss amounted to about \$370,000,000.

New effective insecticides now exist, however, and can be relied upon to reduce

these losses. The only requirements are that these insecticides be applied properly and at the right time.

Here is a 4-point program that every cotton grower should be urged to follow in order to control cotton insects:

1. Know what insects you have to fight.
2. Know what insecticides to use.
3. Inspect cotton at weekly intervals.
4. Consult your county agricultural agent on control recommendations for your area.

KNOW YOUR INSECTS

Boll weevil. The boll weevil is the most destructive of the cotton pests. It caused more than \$40,000,000 loss in edible fats and livestock feed in 1946. Measures for controlling this pest have long been known. However, some of the new insecticides that have recently become available offer greater promise for its destruction.

The weevil prefers to feed upon the squares and it is in the squares that the weevil lays its eggs. The eggs hatch in 3 to 5 days and the white larvae, or grubs, eat the inside of the squares or small bolls, causing most of them to shed. The weevil also attacks the larger bolls. Large punctured bolls are not shed but the segment in which a grub feeds fails to develop properly and the lint therein is stained, or it decays.

Bollworm. The bollworm is a serious pest in Texas, Louisiana, Arkansas, and Oklahoma. At times it reduces the yields in every cotton-growing State. In just one season it was estimated to have caused an \$80,000,000 loss to Texas cotton growers.

Rapidly growing succulent cotton is preferred by the bollworm moth at egg-laying time. The eggs are laid singly on the tender growth and newly-formed squares. They are smaller than the heads of ordinary pins and pearly white when first laid. They change to a dark color before hatching. When they have hatched, the small larvae or "worms" feed on the tender buds or leaves for a few days before burrowing into the squares or bolls. Large worms feed almost entirely inside the bolls and are difficult to control at this stage.

Cotton aphid. The cotton aphid, a small, soft-bodied sucking insect, is the most injurious of the aphids that attack cotton. Its color ranges from light yellow to dark green or almost black. It occurs wherever cotton is grown in the United States. Aphids suck juices from leaves and stems. They cause defoliation and serious reduction in yield when numerous. They secrete a "honey-dew" which promotes growth of a sooty mold that discolors leaves and causes lint to become dark, gummy, and of poor grade. Aphids usually appear in the spring. They are normally held in check by parasites and predators, but these aphid enemies are often killed by insecticides used for the control of other cotton insects, thus bringing about an intensified aphid problem.

Mites. Mites are known also as red spiders. They are so small they can hardly be seen without the aid of a magnifying glass. They are found throughout the Cotton Belt. They may be greenish or yellow in color. The females are usually reddish. The smaller males are reddish-yellow. Red spiders live on the under side of the leaves, where they lay eggs and spin delicate webs. They suck the sap from the leaves. The under surface of the leaves becomes thickly dotted with whitish punctures. Red spider injury is often called "rust." Such injury is first indicated by

blood red spots on the upper surface of the leaf. The entire leaf reddens or turns rusty brown, then curls, and finally drops from the plant. The loss of leaves causes shedding of small bolls. It may also prevent lint from developing properly in large bolls. Hot, dry conditions are favorable for rapid multiplication of these insects. Infestations often develop following use of insecticides that do not contain sulfur. Sulfur is the only insecticide recommended for control of the red spider.

Cotton fleahopper. The cotton fleahopper infests cotton throughout the entire Cotton Belt. Greatest fleahopper damage occurs in Texas, Oklahoma, and Louisiana. Losses also are serious in other States in some years. The fleahopper passes the winter in the egg stage in the stems of croton, other weeds, and to some extent in cotton. The eggs hatch early in the spring. The new fleahoppers develop rapidly on certain tender weeds such as horsemint, croton, and evening primrose. They migrate to cotton when their weed hosts become tough. The winged adults and wingless nymphs, or young fleahoppers, are very active. Both feed on juices of the tender parts of the cotton plants, especially the terminal buds and small squares. Greatest damage is done to small squares which are often killed when they are no larger than a pinhead. Infested plants grow taller, more whiplike, and have fewer large branches than normal plants. Infested plants usually produce only a few bolls near the tops.

Cotton leafworm. The cotton leafworm is a serious pest in the cotton-growing regions of North, Central, and South America. The insect does not survive the winter in the United States. The moths are powerful fliers, however, and during April, May, or June each year they migrate to southern Texas from infested areas outside the borders of this country. Some years they also enter the Cotton Belt in the southeast by migrating north through Florida. The spread of the leafworm varies greatly from year to year. Although damage is usually greatest west of the Mississippi River, control is often needed in the eastern States. The larvae, or "worms," feed only on cotton. The small leafworms feed on the

underside of the leaves and do not cut through the upper surface. The larger worms eat the entire leaf. When abundant, they completely strip the plants and then gnaw on the squares, bolls, and bark until the field looks as if it had been swept by fire. Early stripping of the plants pre-

vents bolls from maturing and causes reduction in yield and quality of the cotton. Small cotton leafworms can be controlled very easily with insecticides. Large worms are more difficult to control and may cause considerable damage.

KNOW YOUR INSECTICIDES

Here are the insecticides which have proved most effective for each insect:

<u>Boll Weevil</u>	<u>Bollworm</u>	<u>Cotton Aphid</u>	<u>Red Spider Mite</u>	<u>Cotton Fleahopper, Tarnished Plant Bug, Rapid Plant Bug</u>	<u>Cotton Leafworm</u>
Calcium arsenate	DDT	Benzene hexachloride	Sulfur	DDT	Calcium arsenate
Benzene hexachloride	Chlorinated camphene	Nicotine		Chlorinated camphene	Benzene hexachloride
Chlorinated camphene	Calcium arsenate	Chlorinated camphene		Benzene hexachloride	Chlorinated camphene
		Rotenone		Sulfur	

Mixtures of two or three insecticides are often necessary to control the different insects that may be in cotton fields. Where the red spider mite must be controlled, sulfur should be part of the insecticide formulation. Where the cotton aphid is a problem, nicotine, rotenone, or benzene hexachloride should be used. Three mixtures that are now widely recommended for control of cotton pests are:

- 5% DDT + 3% gamma benzene hexachloride + at least 40% sulfur
- 20% chlorinated camphene + at least 40% sulfur
- Calcium arsenate + at least 1% nicotine

CAUTION: Remember that calcium arsenate, benzene hexachloride, chlorinated camphene, DDT, and nicotine, like most other insecticides, are poisonous. Proper pre-

cautions should be taken in handling them. Read and observe the warnings on the labels. Do not inhale fumes or dust. Wash hands thoroughly with soap and water after mixing and applying. Thoroughly clean all vessels and clothing used before storing or reusing them. Keep poisons out of reach of children.

INSPECT WEEKLY

Cotton fields should be inspected thoroughly every seven days or oftener.

When 10 to 25 percent of the squares are found punctured by the boll weevil, insecticides should be used.

When it is about time for bollworms to appear, or when corn and other plants that are host to this insect start to dry out, the tops of the cotton plants should be examined for eggs and small bollworms. When

20 to 25 hatching eggs are found per 100 plants, it is time to begin dusting. Successful bollworm control depends on heavy applications of dust while the eggs are hatching and before the bollworms enter the bolls.

When "honey-dew" of aphids begins to appear, aphid control should start immediately.

When blood red spots begin to appear on the upper surface of cotton leaves, control measures for red spider mite should be started.

If cotton is not squaring properly, or if cotton fails to set small squares, the tips of the main stems (terminal buds)

should be examined for fleahoppers. Dusting should be started when 15 to 25 fleahoppers are found per 100 terminal buds.

When small cotton leafworms are found in numbers, insecticides should be applied promptly.

KNOW BEST METHODS

Cotton insect problems differ materially from one area to another and control recommendations differ accordingly. Every cotton grower who has an insect control problem should consult his county agricultural agent, extension entomologist, or State agricultural experiment station for best control measures for his locality.

